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Four hundred and second meeting.

June 27, 1854. — MONTHLY MEETING.

The PRESIDENT in the chair.

Professor J. S. Cooke presented a memoir "On Stibiobizincyle and Stibiotrizincyle, two new Compounds of Zinc and Antimony." This memoir was referred to the Committee of Publication.

Four hundred and third meeting.

August 9, 1854. — QUARTERLY MEETING.

The PRESIDENT in the chair.

At the request of the Treasurer, the following vote was laid before the Academy, and unanimously adopted : —

" *Voted*, That the Secretary be directed to inform the executors of our late esteemed associate, Dr. George C. Shattuck, that the Academy have received his bequest, a share in the Cocheco Manufacturing Company, and to express their grateful sense of this mark of his regard."

A paper was received from Professor Gray, entitled, "Characters of some New Genera and Species of Plants in a Collection made by George Thurber, Esq., of the late Mexican Boundary Commission, chiefly in New Mexico, Southwest California, and Sonora." The plants described are *Ranunculus hydrocharoides ; Argemone fruticosa*, Thurber; *Malvastrum Thurberi ; Abutilon Thurberi ; Thurberia thespesioides*, a new and striking Malvaceous genus allied to Thespesia; *Holacantha Emoryi*, a new genus of Simarubaceæ allied to Castela; *Guaiacum Coulteri ; Astragalus Thurberi ; Daubentonia Thurberi ; Robinia Neo-Mexicana ;* five new species of *Dalea ; Hosackia argophylla ; Acacia? crassifolia*, an anomalous species as to the foliage ; *Potentilla Thurberi*, a new red-flowered species ; *Petalonyx Thurberi*, an interesting addition to the tribe Gronovieæ of the order Loasaceæ ; *Eremiastrum bellioides*, an Asteroid genus, intermediate between Erigeron and Bellium ; *Melampodium longicorne ; Dy-*

sodia porophylloides; Psathyrotes incisa; Bartlettia scaposa, a new genus of Senecioneæ, dedicated to the U. S. Boundary Commissioner under whose instructions this collection was made; *Perezia Thurberi; Stephanomeria Thurberi; Jacquinia pungens;* and *Pilostyles Thurberi*, a parasitic flower of the order Rafflesiaceæ, of which it is the only representative in North America.

Professor Horsford exhibited an obstruction which had been removed from a wooden pump-log at the Water-Cure establishment of Brattleboro, Vt., formed of a compact mass of small root-fibres, entirely closing the tube of the log. It was three feet in length, and was developed from a slender fibre of the root of a neighboring tree, which had penetrated by a small crevice at a joint in the log. The log had been two years in the ground.

Dr. Walter Channing asked for an explanation of the fact, that, in solar eclipses, the luminous spots upon the ground produced by the light which penetrated the foliage were always of the same shape as the uneclipsed portion of the sun.

Professor Lovering remarked in reply: —

"This phenomenon has been frequently noticed. It excited attention in the progress of the great eclipse of 1806, and is mentioned by Sir J. F. W. Herschel in reference to the eclipse of September 7, 1820. The explanation of it which the rectilinear motion of light offers is simple and sufficient. If the aperture is a physical point, a cone of rays will pass through it, having this point as its apex. The section of this cone by a screen at right angles to its axis will have the same figure as the body from which the light comes, and its diameter will be equal to the diameter of the luminous body multiplied by the distance of the screen from the aperture, and divided by the distance of the luminous body from the same point. Hence, for the same body, it increases as the screen is placed at greater distances. If the luminous body is a physical point, and the aperture not, a pencil of rays will pass through, which is a continuation of the cone of which the luminous point is the apex, and the apertures the base. The section of this pencil at right angles to its axis will have the shape of the aperture, and its size will equal that of the aperture itself multiplied by the distance of the luminous point from the aperture added to the distance of the aperture from the screen, and divided by the distance of the luminous point from the aperture. Hence it is obvious that the size increases more slowly than the distance of the screen from the aperture, and in the case of a distant object, like the sun, almost imperceptibly. When neither the aperture nor the luminous object is a physical point, each strives to imprint its own figure upon the screen, and the resulting shape will resemble that of the aperture or the object according to the size of the two images which each would separately impress, as calculated above. If the size of the aperture is to the size of the luminous object as the distance between the aperture and screen is to the distance between the luminous body and the screen, the separate images which the aperture and the luminous body will form are of the same size, and therefore their shape is equally influential in forming the resulting figure. When the distance of the screen is thirty feet from the aperture, the two images above described are of the same size with solar light if the aperture is between three and four inches. Now when the distance between the screen and the aperture is changed, the size of the image which belongs to the luminous body changes much more than that which belongs to the aperture. Consequently, if the screen on which the images are painted is much farther than thirty feet, the size of the aperture being three or four inches, or if the size of the aperture is diminished, the distance between the screen and the aperture remaining the same, the influence of the sun's form will prevail, and in extreme cases the resulting figure will represent the shape of the sun to the exclusion of all trace of the shape of the aperture. Hence with very small apertures the final image will have no resemblance in shape to the aperture, except when received very near to the aperture. But with nearer bodies, as the flame of a candle, the shape of the aperture continues upon the screen at larger distances, or with the same distance when smaller apertures are employed."

Four hundred and fourth meeting.

September 12, 1854. — MONTHLY MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters from Sir William Hamilton, accepting his appointment of Foreign Honorary